



CHEMICAL EMERGENCY PREVENTION & PLANNING

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EPA settles with Enchanted Parks, Inc., for chemical reporting violations

(Federal Way, WA) Enchanted Parks, Inc., reached a \$7,000 settlement with the U.S. Environmental Protection Agency (EPA) for failing to properly report on chemicals stored and handled at the company's popular Enchanted Village water park near I-5 in Federal Way.

In addition to the penalty, Enchanted Parks also agreed to pay over \$14,000 for emergency response equipment for the South King Fire and Rescue Department.

From 2001-2004, the facility failed to file proper chemical inventory reports with the State Emergency Response Commission (SERC), Local Emergency Planning Committee (LEPC) and local fire department. These reporting failures violated the Federal Emergency Planning and Community Right-to-Know Act (EPCRA).

According to Mike Bussell, Director of EPA's Office of Compliance & Enforcement in Seattle, planning and preparedness laws help save lives. "These laws help communities prepare for and safely respond to chemical accidents," Bussell said. "They also help reduce the likelihood and severity of accidental chemical releases that could harm the public and the environment."

At its Federal Way facility, Enchanted Parks uses and stores Sodium Hypochlorite (a disinfectant), bleach and Hydrochloric Acid. Sodium Hypochlorite and Hydrochloric Acid are listed as hazardous substances under the Occupational Safety and Health Act (OSHA). Hydrochloric Acid must be handled with appropriate safety precautions because it is a highly corrosive liquid.

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CSB Issued Safety Bulletin on Dangers of a Major Chlorine Release During Railcar Unloading

The U.S. Chemical Safety Board (CSB) released a safety bulletin warning that some chlorine railcar transfer systems lack effective detection and emergency shutdown devices, leaving the public vulnerable to potential large-scale toxic releases.

The Board formally recommended that the U.S. Department of Transportation (DOT) expand its regulatory coverage

to require facilities that unload chlorine railcars to install remotely operated emergency isolation devices to quickly shut down the flow of chlorine in the event of a hose rupture or other failure in the unloading equipment. The safety bulletin cites two previous incidents of accidental chlorine releases that occurred as a result of ruptured transfer hoses. Chlorine railcars are equipped with an

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internal excess flow valve (EFV) that is designed to stop the flow of chlorine if an external valve breaks off while the railcar is in transit. However, these EFVs are not designed to stop leaks during railcar unloading, and the failure of a transfer hose may not activate the EFV and the toxic chlorine will continue to escape. Companies should install emergency shutdown systems that can quickly stop the flow of chlorine if a hose ruptures during the unloading operation, the bulletin said.

In August 2002 a hose ruptured at a DPC Enterprises plant near Festus, Missouri (see *"Chlorine Transfer Hose Rupture"* article next page). The emergency shutdown valves did not close as designed due to poor maintenance, and the EFV did not close. The only way to stop the release of chlorine from the railcar was to send emergency responders through a four-foot deep yellowish-green fog of chlorine vapor to manually close shutdown valves located on top of the railcar. Incidents such as the one at DPC demonstrate why EFVs should not be relied upon to stop hazardous material releases during unloading operations.

However, in a survey of drinking water and wastewater treatment facilities conducted by the CSB, investigators found that approximately 30 percent of the bulk chlorine users contacted continue to rely solely on the EFV to stop chlorine flow in the event of a transfer hose rupture.

The DOT Hazardous Materials Regulations (HMR) regulate transportation of hazardous materials by rail, aircraft, vessel, and motor vehicle tank truck and currently require emergency shutdown equipment for motor vehicle tank truck chlorine transfer systems but not for railcar chlorine transfer systems.

The safety bulletin compares two chlorine releases from railcars that were investigated by the CSB. The first incident, discussed briefly above, involved a 48,000 pound release of chlorine at DPC Enterprises due to a ruptured transfer hose. As a result hundreds of residents were evacuated or were required to shelter in place, 63 residents sought medical attention and three were admitted to the hospital. The second incident occurred in August 2005 at Honeywell International's Baton Rouge

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Chlorine Transfer Hose Rupture

Here's What Happened

On August 2002, chlorine was being transferred from a railroad tank car at DPC Enterprises plant near Festus, Missouri when the transfer hose burst. Both automatic and manual emergency shutdown systems failed so the release was unabated for about three hours. Approximately 48,000 pounds (21,800 kg) of chlorine escaped before emergency responders were able to stop the release. They entered the chlorine cloud wearing "Class A" safety gear and climbed on top of the car to close the manual shut off valves.

Nearby neighbors either evacuated or "sheltered-in-place." The adjacent Interstate was closed to traffic for 1½ hours. Of the 63 people that sought medical evaluations due to respiratory distress, 3 were hospitalized. The release also damaged trees and other vegetation in the area.



DPC Railroad tank car unloading station.



Hastelloy (left) and stainless steel hoses appear identical.

How Did this Happen?

- The ruptured hose should have had an inner Teflon liner reinforced with a Hastelloy C-276 exterior metal braiding. Instead, the exterior metal support braiding was stainless steel and was easily corroded by chlorine permeation through the Teflon liner. The hose failed after less than 2 months of service.
- Both the purchase and shipping papers indicated that the hose was constructed of the proper materials, but it was not tested or verified upon receipt.
- An emergency shut down system activated by an employee before evacuation failed to work because of severe build up on the valve ball.

What You Can Do?

- Know what to do in an emergency! Always check to ensure that emergency shutdown equipment has a current test tag. If it does not, report it. Test the entire shut down loop before you rely on it. Your job —make sure it will work when needed!
- Conduct a pre-use check before using any replaceable equipment, such as hoses, sample containers, instruments, etc. to be sure that they are fit for the service. If in doubt—do not use it!
- When receiving new equipment make sure that it is exactly what was ordered. Some materials are difficult to tell from others, but performance may be significantly different!
- Ask for "positive materials identification" testing where different materials look alike. This is especially important where a mix-up can lead to a hazardous event. Make this part of the area's process hazards analysis.

chemical plant when chlorine began to escape from a railcar due to a transfer hose failure. There, the emergency shutdown system functioned properly and the release lasted less than one minute. There was no impact to the surrounding community.

Investigator Lisa Long said, 'In contrast to the 2002 incident at DPC, the rapid and successful activation of the emergency shutdown system at Honeywell prevented a major release and limited off-site impacts to the surrounding community.'

The CSB recommendation calls on DOT to expand regulatory coverage to require railcar unloading operations to have the following safeguards:

- Remotely operated isolation devices that will quickly isolate a leak in any of the flexible

hoses used to unload a chlorine car.

- The shutdown system must be capable of stopping a chlorine release from both the railcar and the equipment at the facility receiving the chlorine.
- Periodic maintenance and operational testing of the emergency isolation system to ensure it will function in the event of an unloading system chlorine leak

The CSB is an independent federal agency charged with investigating industrial chemical accidents. The Board does not issue citations or fines but does make safety recommendations to plants, industry organizations, labor groups, and regulatory agencies such as OSHA and EPA. Visit CSB website, www.csb.gov.

Preventing Chlorine Accidental Releases



Alberton, MT; KPAX TV video; Missoula, MT
Nov. 2003: Derailed tank car in Alberton, Montana releasing 130,000 lbs chlorine.



Aug. 2002: Ruptured chlorine transfer hose releasing 48,000 lbs chlorine in Festus, Missouri.

This article introduces cost effective options to prevent and mitigate chlorine releases. This information is intended as general guidance only. It is not a substitute for any applicable local, state or federal regulations. Specific release costs and facility prevention choices should be determined on a case-by-case basis.

Did you know?

Chlorine gas is one of the most prevalent extremely hazardous substances. Chlorine gas is primarily used as a disinfectant by swimming pool, drinking water and wastewater facilities.

- Chlorine is a greenish-yellow gas with a characteristic odor. Chlorine is primarily a respiratory toxicant that can cause lung irritation, and death.
- Chlorine gas, by far, presents one of the greatest chemical threat to community populations.
- National studies indicate that approximately 75% of all accidental releases of hazardous chemicals occur at fixed facilities. Chlorine gas is one of the ten hazardous chemicals most commonly involved in a release, and the one most likely to result in death or human injury due to a release.

What are the common causes of releases?

The three leading causes of accidental releases of chlorine are (1) *Operations and maintenance failures*, (2) *equipment failures*, and (3) *process failures*. Significantly fewer releases are caused by unauthorized activity, natural events, and fires.

- (1) *Operations and Maintenance Failures* include lack of adequate training, standard operating procedures, safety programs, management commitment to safety, and faulty repairs and inattentiveness leading to leaks, overfills, and
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broken equipment.

- (2) **Equipment Failures** include defective equipment design, construction and installation that result in overflowing containers, and leaking piping, valves, and gaskets.
- (3) **Process Failures** include pressure, temperature, flow and fluid chemistry changes that result in tank and/or piping ruptures.

Why prevent releases?

Preventing accidental releases of chlorine gas benefits both communities and facilities.

- Communities Benefit From:
 - Good image as a place to live and work with low risk to human health and safety from a release.
 - Reduced costs from emergency response personnel responding to fewer or no releases.
 - Cleaner environment creating opportunities for other businesses and increasing visitor popularity.
- Facilities Benefit From:
 - Reduced costs due to fewer or no accidental releases.
 - Increased worker satisfaction from employee awareness that management is concerned about safety.
 - Good business practices resulting in fewer federal, state, and local restrictions on operations.

What could facility release costs include?

Facility owners/operators and employees are not always aware of the full range of potential costs associated with an accidental release. The following are the types of costs that a facility may incur:

- Facility Direct Costs:
Chemical loss, Attorney's fees, Equipment damage, Waste disposal, Clean up, Public relations, Process disruption, Increased insurance and premiums.
- Third Party Costs:
Property damage, Economic loss, Punitive damages, and Injury/loss of life.
- State Penalties and Cost Recovery:
Civil and criminal penalties, Restoration and Damages, Administrative penalties, State expenses, and Attorney's fees.
- Federal Penalties and Cost Recovery:
Civil and criminal penalties, Administrative penalties, and Cost recovery.

What can be done?

There are three basic categories of options that facilities can use to prevent and mitigate accidental releases.

(1) Eliminate Releases

Eliminate the use of a hazardous substance by substituting a less or non-hazardous substance. This protects the facility and the surrounding community from a hazardous substance release. By eliminating the use of toxic substances a facility can also significantly reduce current and potential costs and liabilities. There are several alternatives to chlorine gas for water disinfection, however, many of them pose their own hazards. Substitutes include hypochlorites, chlorine dioxide, chloramines, ozone, and ultraviolet radiation. A facility must carefully review these options to determine whether they are feasible.

(2) Reduce Risk

Build a comprehensive program to prevent accidental releases. This step can eliminate the greatest causes of hazardous substance releases: operations, maintenance, and equipment problems. A facility should identify risks and determine methods of limiting those risks throughout its operations, including:

- Inventory reduction/control: Reduce inventories of hazardous substances to the minimum needed, to reduce the potential for releases.
- Management systems: Ensure that management practices and worker training give priority to prevention and release reduction.
- Personnel training: Ensure that all personnel are adequately trained.
- Security measures: Improve security to minimize the potential for unauthorized activities.
- Process design: Install additional sensors to allow better monitoring of process conditions.

(3) Reduce Consequences

By installing and maintaining specific equipment and structures a facility is able to reduce the adverse affects of many releases, including those that may not be a function of the facility's operations, such as: natural events, fires, and unauthorized activities. A facility should identify its best options to mitigate accidental releases. Such options include:

- Gas detectors: electrochemical gas detectors are commonly used to detect very low concentrations of chlorine. Early detection may allow time for repairs to be made using specifically designed chlorine emergency kits.
- Containment systems: "coffins" can be used in some circumstances to enclose a leaking cylinder and remove it from the facility.
- Treatment systems: scrubbers and absorption tanks are used to neutralize the chlorine before the gas is vented. Scrubbers are currently required by the Unified Fire Code for all new facilities using chlorine gas.

(Source: AK Department of Environmental Conservation)

Chlorine Training

Companies should train on chlorine because this enhances safe, effective operations. Companies are required by the following agencies to train under the following rules:



Classroom training on clothing and equipment used for personal protection. In this class, the instructor is demonstrating how to don and doff a level B protection suit and respirator. Level B personal protection includes a full-body suite with a full face-piece or air-respirator. Personal protective clothing and equipment (PPE) is vital to prevent risks to personnel from hazardous vapors, gases, and particulates.



A person is helping a student don a Level B personal protective suit and respiratory protection. Selecting the proper PPE for a site involves identifying the potential hazards that may be faced, the work requirements, and task-specific conditions, as well as assessing the durability and performance of the PPE material. PPE ensembles are classified into 4 levels, depending on the need for protection at a specific site.

Agency	Citation	Description
EPA	40 CFR Part 68, from section 112(r) of the Clean Air Act	Risk Management Program (RMP) - for facilities who have over 2,500 pounds in any "process" (storage is considered a process under this standard).
OSHA	29 CFR 1910.1200	Chemical Specific Hazard Communication – requires initial training and training with any new hazard introduced.
OSHA	29 CFR 1910.119	Process Safety Management (PSM) – for facilities with more than 1,500 pounds in any "process". Requires training at least every 3 years, an annual certification of operating procedures, and emergency response training.
OSHA	29 CFR 1910.138 & 120	Emergency Action Plan – required for all covered facilities, spells out emergency procedures.
OSHA	29 CFR 1910.132-138	Personal Protective Equipment standards – requires annual training on necessary PPE.
OSHA	29 CFR 1910.120	a.k.a. "Hazwopper" training – for emergency responders who will respond to spills or other emergency releases. Initial and refresher training required.
DOT	40 CFR 172.704	Hazardous Materials – Awareness, function specific, and safety training (drivers also have additional training) for anyone who ships or receives DOT hazardous materials. Required once every 3 years.
ANSI	References the Chlorine Manual	This may be used by OSHA/EPA under the General Duty Clauses of the respective agencies.

(Reference: The Chlorine Institute, Inc.)

What has happened since September 11, 2001?



September — a month that brings memories of the tragic events of September 11, 2001. Four airplanes were hijacked by an organized group of terrorists. Two planes struck the World Trade Center Towers in New York City —causing both to tragically crash to the ground. A third struck the Pentagon in Washington DC and a fourth crashed in a field in Pennsylvania. Thousands of lives were lost along with billions of dollars in property damage amidst untold human suffering. The efforts of the emergency response organizations were truly heroic and played a major role in restoring order out of the chaos.



What has happened since...

There have been a number of actions by governments, trade and professional associations and individual companies, including:

- The US federal government created the Department of Homeland Security (DHS) which continues to aggressively improve security systems across the country.
- State and local governments have reviewed their security systems and have made a variety of significant improvements.
- The US Coast Guard and Department of Transportation have published federal regulations dealing with security issues.
- AIChE's Center for Chemical Process Safety (CCPS) developed and distributed "Guidelines for Analyzing and Managing the Security Vulnerabilities at Fixed Chemical Sites".
- American Chemistry Council members have implemented the Security Code of Responsible Care.
- Many chemical facilities globally have completed a Security Vulnerability Analysis (SVA) and have implemented recommendations.

What You can do...

An informed, watchful workforce is a major element in any site's security effort.

- ✚ Question things that look out of place: packages, people and transportation vehicles should have been "requested" by someone at your site. If they are present for no apparent reason, there is immediate cause for concern. Get the right people involved in investigating these questionable activities and events.
 - ✚ Your site may have a variety of security procedures dealing with suspicious packages, bomb threats, emergency response and others. Take time to read them and understand your role in carrying them out.
 - ✚ Be particularly diligent if your site handles hazardous chemicals. These facilities are especially sensitive and should receive special attention.
 - ✚ Housekeeping is an important element in site security. A clean plant is a plant where "unusual items" are readily detected.
 - ✚ Recognize that increased security may result in increased inconveniences. Be tolerant of them.
- (Reference: Process Safety Beacon)

DHS Issued Anti-Terrorism Standards for Chemical Facilities

In a new regulation (6 CFR Part 27) which may affect as many as a quarter of a million facilities nationwide, the Department of Homeland Security (DHS) will begin requiring vulnerability assessment and security planning for locations that store hazardous chemicals. Inclusion under the regulation is dependent upon the type and amount of chemicals stored. Chemicals included are such common substances as propane, acetone, chlorine, ammonia, ammonium nitrate and many pesticides. The thresholds for inclusion are generally lower than other regulatory programs.

The new regulation is relevant for all RMP facilities. DHS's threshold quantities are less than the RMP's thresholds on all RMP chemicals except:

- o CAS 10049-04-4: Chlorine dioxide / Chlorine oxide (RMP: 1,000 lbs vs. DHS: 2,000 lbs)
- o CAS 624-83-9: Methane, isocyanato- / Methyl isocyanate (RMP: 10,000 lbs vs. DHS: 11,250 lbs)

Covered facilities will be grouped into tiers depending on risk potential. Higher tier facilities will have more stringent performance-based security requirements. The regulatory process includes extensive security vulnerability assessment, security planning, exercises and record keeping. This includes selecting, developing and implementing measures such as securing the facility perimeter, restricting site access, employee background checks, theft prevention, cyber security, response and emergency planning & training, as well as monitoring/warning activities.

The following facilities are exempt from this new DHS regulation:

- o Public Water Systems (Section 1401 Safe Drinking Water Act)
- o Water Treatment Works Facilities (Section 212 Federal Water Pollution Control Act)
- o Any facilities owned or operated by the Departments of Defense and Energy
- o Any facilities subject to regulation by the Nuclear Regulatory Commission
- o Maritime facilities regulated by the Coast Guard (Maritime Transportation Security Act of 2002)

While there are exemptions for public water and wastewater systems along with federal facilities, large



numbers of facilities that have not previously been regulated will be included in this process. LEPCs can perform a critical role in alerting facilities of these new requirements. As specifics of this regulation become clearer, the state and the National Association of SARA Title Three Program Officials (NASTTPO) expects to provide compliance assistance to covered facilities.

All locations storing chemicals should be aware of this new regulation and begin preparing now to address security concerns. Don't assume that your location will not be covered; if you store chemicals this regulation will probably apply to you. The world has changed. The days of unlocked gates, lax training programs, on the fly emergency response and assuming 'it can't happen here' have passed. Chemical security assessment and planning is today's reality. Now is the time to begin preparing for these new concerns.

Threat/Vulnerability Assessments and Risk Analysis of Buildings and Facilities

Participating Agencies



Administrative Office of the United States Courts (AOUSC)



Department of Defense (DOD)



Department of Energy (DOE)



Department of Homeland Security (DHS)



Department of Veterans Affairs (VA)



Environmental Protection Agency (EPA)



General Services Administration (GSA)



National Aeronautics and Space Administration (NASA)



National Institutes of Health (NIH)



**National Park Service (NPS)
U.S. Department of the Interior**



Smithsonian Institution

APPLICATION

Threat/vulnerability assessments and risk analysis can be applied to any facility and/or organization. The federal government has been utilizing varying types of assessments and analyses for many years. Currently, the U.S. General Services Administration (GSA) and the Federal Protective Service of the Department of Homeland Security are utilizing a methodology entitled Federal Security Risk Management (FSRM). This process is basically the methodology described in this Resource Page.

A. Threat Assessment

The first step in a risk management program is a threat assessment. A threat assessment considers the full spectrum of threats (i.e., natural, criminal, terrorist, accidental, etc.) for a given facility/location. The assessment should examine supporting information to evaluate the likelihood of occurrence for each threat. For natural threats, historical data concerning frequency of occurrence for given natural disasters such as tornadoes, hurricanes, floods, fire, or earthquakes can be used to determine the credibility of the given threat. For criminal threats, the crime rates in the surrounding area provide a good indicator of the type of criminal activity that may threaten the facility. In addition, the type of assets and/or activity located in the facility may also increase the target attractiveness in the eyes of the aggressor. The type of assets and/or activity located in the facility will also relate directly to the likelihood of various types of accidents. For example, a facility that utilizes heavy industrial machinery will be at higher risk for serious or life-threatening job related accidents than a typical office building.

For terrorist threats, the attractiveness of the facility as a target is a primary consideration. In addition, the type of terrorist act may vary based on the potential adversary and the method of attack most likely to be successful for a given scenario. For example, a terrorist wishing to strike against the federal government may

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be more likely to attack a large federal building than to attack a multi-tenant office building containing a large number of commercial tenants and a few government tenants. However, if security at the large federal building makes mounting a successful attack too difficult, the terrorist may be diverted to a nearby facility that may not be as attractive from an occupancy perspective, but has a higher probability of success due to the absence of adequate security. In general, the likelihood of terrorist attacks cannot be quantified statistically since terrorism is, by its very nature, random. Hence, when considering terrorist threats, the concept of developing credible threat packages is important.

B. Vulnerability Assessment

Once the credible threats are identified, a vulnerability assessment must be performed. The vulnerability assessment considers the potential impact of loss from a successful attack as well as the vulnerability of the facility/location to an attack. Impact of loss is the degree to which the mission of the agency is impaired by a successful attack from the given threat.

- **Devastating:** The facility is damaged/contaminated beyond habitable use.
- **Severe:** The facility is partially damaged/contaminated.
- **Noticeable:** The facility is temporarily closed or unable to operate, but can continue without an interruption of more than one day.
- **Minor:** The facility experiences no significant impact on operations (downtime is less than four hours) and there is no loss of major assets.

Vulnerability is defined to be a combination of the attractiveness of a facility as a target and the level of deterrence and/or defense provided by the existing countermeasures.

- **Very High**
- **High**
- **Moderate**
- **Low**

C. Risk Analysis

A combination of the impact of loss rating and the vulnerability rating can be used to evaluate the potential risk to the facility from a given threat. A sample risk matrix is depicted in Table 1. High risks are designated by the red cells, moderate risks by the yellow cells, and low risks by the green cells.

Table 1. Matrix identifying levels of risk

Impact of Loss	Vulnerability to Threat			
	Very High	High	Moderate	Low
Devastating				
Severe				
Noticable				
Minor				

The ratings in the matrix can be interpreted as explained below:

Table 2. Interpretation of the risk ratings

	These risks are high. Countermeasures recommended to mitigate these risks should be implemented as soon as possible.
	These risks are moderate. Countermeasure implementation should be planned in the near future.
	These risks are low. Countermeasure implementation will enhance security, but is of less urgency than the above risks.

D. Upgrade Recommendations

Based on the findings from the risk analysis, the next step in the process is to identify countermeasure upgrades that will lower the various levels of risk.

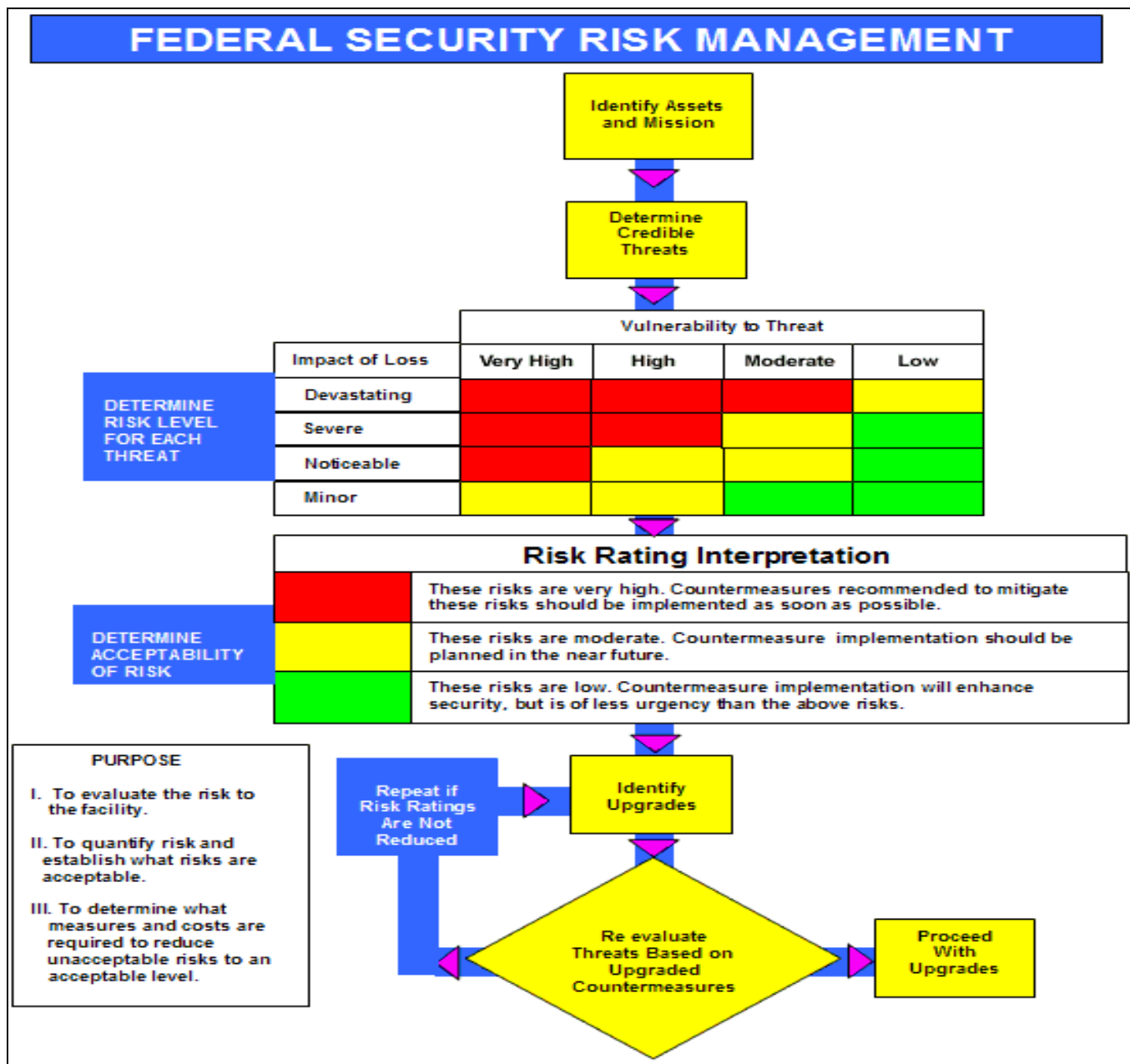
E. Re-Evaluation of Risks

The implementation of the recommended security and/or structural upgrades should have a positive effect on the impact of loss and/or the vulnerability ratings for each threat. The final step in the process is to re-evaluate these two ratings for each threat in light of the recommended upgrades.

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F. Summary

The overall threat/vulnerability and risk analysis methodology is summarized by the flowchart below.



RELEVANT CODES AND STANDARDS

- Executive Order 12977, "Interagency Security Committee"
- Federal Emergency Management Agency (FEMA)—*Publication No. 386-7 Integrating Human-Caused Hazards into Mitigation Planning*
- FEMA 452 *Risk Assessment - A How-To Guide to Mitigate Potential Terrorist Attacks Against Buildings*
- Interagency Security Committee (ISC) Security Design Criteria—Defines Threat/Risk classifications and resultant federal protective design requirements (Official Use Only)
- Unified Facilities Criteria (UFC)—*UFC 4-010-01 DoD Minimum Anti-Terrorism Standards for Buildings*—Establishes prescriptive procedures for Threat, Vulnerability and Risk assessments and security design criteria for DoD facilities (Official Use Only)

(
Reference: The Whole Building Design Guide)

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November 5-8, 2007

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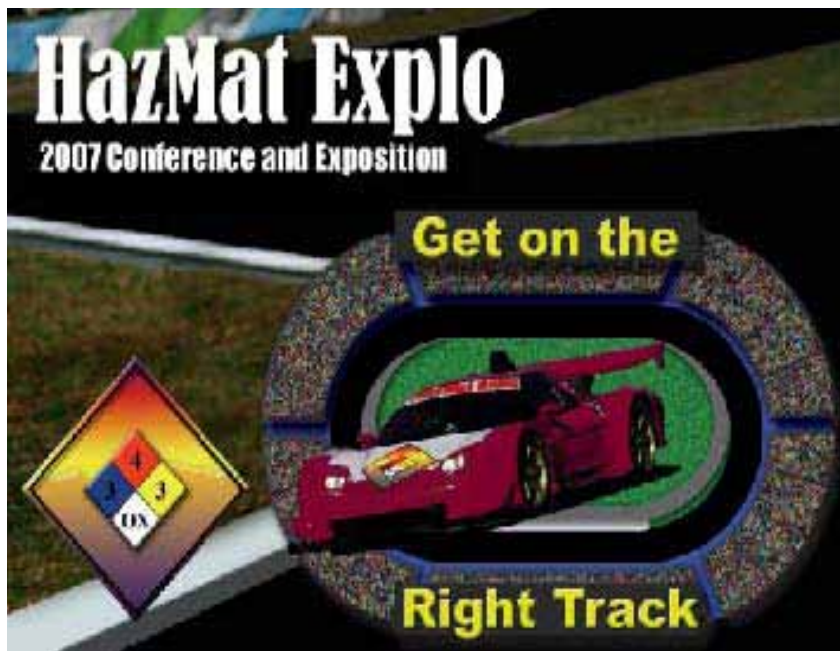
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